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TEXAS AGRICULTURAL EXPERIMENT STATION
AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
W. B. BIZZELL, President

BULLETIN NO. 277 MARCH, 1921

SWEET POTATO FERTILIZER EXPERIMENTS

AT

SUBSTATION NO. 2, TROUP

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COLLEGE STATION, BRAZOS COUNTY, TEXAS

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†As of February 15, 1921.
*In cooperation with School of Veterinary Medicine, A. and M. College of Texas.
**In cooperation with United States Department of Agriculture.

BULLETIN No. 277. MARCH, 1921.

SWEET POTATO FERTILIZER EXPERIMENTS AT SUBSTATION NO. 2, TROUP

BY W. S. HOTCHKISS

SWEET POTATO FERTILIZER EXPERIMENTS

This bulletin reports the results of fertilizer experiments with sweet potatoes which were conducted at Substation No. 2, Troup, Smith County, Texas, in 1907, 1908, and 1911.

The topography of this region is gently rolling to moderately hilly. The prevailing soil types are fine sandy loams and fine sands. These conditions are typical of a large part of eastern and northeastern Texas.

Table 1 shows the distribution of the rainfall from January to September, inclusive, for the three years.

Table 1.—Inches rainfall from January to September, inclusive, for 1907, 1908, and 1911.

Month.	1907	1908	1911
January	2.89	2.13	.45
February	2.19	4.23	3.93
March	2.39	2.74	3.38
April	3.68	6.64	7.32
May	7.79	15.87	2.28
June	1.26	1.61	.68
July	4.78	.79	6.19
August	2.18	6.04	1.31
September	1.69	4.35	.28
Total	28.85	44.4	25.82

The rainfall from May to September, inclusive, in 1907, 1908, and 1911, was 17.70, 28.66, and 10.74 inches, respectively.

The soils on which these experiments were conducted are classed by the Bureau of Soils as Susquehanna fine sandy loam. This soil is grayish in color with a red plastic clay subsoil mottled with drab or yellow or both. The Susquehanna fine sandy loam is typical of large areas of soil in eastern and northeastern Texas. In 1907 the test was on a poorly drained phase of the Susquehanna fine sandy loam, which varied in depth from four to six inches. The plats in 1908 and 1911 were on a better drained soil, which varied from six to twelve inches in depth.

Under favorable weather conditions this soil will produce one-fourth to one-third of a bale of cotton, or twelve to fifteen bushels of corn to the acre without fertilizer.

METHOD OF CONDUCTING TEST

The method of applying the fertilizer was the same throughout the experiment; that is, furrows were opened and the proper fertilizer was

carefully weighed and distributed by hand in the furrows and bedded with two furrows. The rows were four feet apart with the plants placed two feet apart in the row. In all the experiments a good strain of the Dooly Yam was used. The slips, or sprouts, were planted in the field May 10, 1907; May 25, 1908; and May 16, 1911.

EXPERIMENT DATA

Table 2 shows the plan of the experiment and the acre yield of each plat in 1907 and 1908 with averages.

Table 2.—Fertilizer experiments with sweet potatoes, 1907-1908.

Plat	Kind of fertilizer used.	Pounds of fertilizer per acre.	Yield in bushels per acre.		
			1907	1908	Average
1	Check, No fertilizer	.....	120	65	92.5
2	Cotton seed meal	260	208	79	143.5
3	Acid phosphate	320	208	85	146.5
4	Acid phosphate	400	215	85	150.0
5	Sulphate of potash	80	146	63	129.5
6	Check, No fertilizer	.....	125	64	94.5
7	Cotton seed meal	500	230	90	160.0
8	Acid phosphate	500	242	116	179.0
9	Acid phosphate Cotton seed meal	320 260	268	127	158.0
10	Cotton seed meal Sulphate of potash	260 80	207	135	171.0
11	Acid phosphate Sulphate of potash	320 80	181	124	152.5
12	Check, No fertilizer	.....	116	96	106.0
13	Acid phosphate Cotton seed meal Sulphate of potash	320 260 80	249	104	176.5
14	Nitrate of soda Acid phosphate Sulphate of potash	130 320 80	246	157	201.5
15	Cotton seed meal	580	221	125	173.0
16	Acid phosphate	580	228	106	167.0
17	Check, No fertilizer	.....	130	93	111.5
18	Acid phosphate Cotton seed meal Sulphate of potash	400 325 100	220	131	153.5

Plat 14, which received a mixture of nitrate of soda, acid phosphate, and sulphate of potash, produced the highest average yield for 1907 and 1908. Acid phosphate applied at the rate of 500 pounds to the acre gave the second largest yield. Sulphate of potash applied with either acid phosphate or cottonseed meal gave little or no increase in yield over cottonseed meal or acid phosphate alone. All the plats that received acid phosphate gave slightly higher average yields than those plats that received cottonseed meal.

In 1908, one end of the field used was on better soil than the other end. This is shown by the fact that check plats 12 and 17 yielded

nearly 50 per cent. more than check plats 1 and 6. As the potash-treated plats were on better soil, the apparent increase in yield due to potash in 1908 may be attributed to lack of uniformity in the soil. This fact makes it appear that the potash is even of less value than the actual figures show.

The yields in 1907 were much larger than in 1908 and 1911. This was probably due to the fact that the rainfall was more evenly distributed throughout the growing period that year, as shown in Table 1.

The results secured in 1911 are presented in Table 3. It will be noted that the fertilizer treatments are smaller than the treatments in 1907 and 1908.

Table 3.—Fertilizer experiments with sweet potatoes, 1911.

Plat	Kind of fertilizer used.	Pounds of fertilizer per acre.	Yield in bushels per acre.
1	Check, No fertilizer	.....	69.8
2	Cotton seed meal	200.0	81.3
3	Acid phosphate	200.0	96.0
4	Acid phosphate	300.0	117.2
5	Cotton seed meal	300.0	95.5
6	Acid phosphate Cotton seed meal	150.0 150.0	96.0
7	Check, No fertilizer	.....	75.3
8	Sulphate of potash	80.0	77.4
9	Cotton seed meal Sulphate of potash	200.0 80.0	98.1
10	Cotton seed meal Acid phosphate Sulphate of potash	150.0 150.0 50.0	98.1
11	Acid phosphate Sulphate of potash	200.0 80.0	97.1
12	Acid phosphate Cotton seed meal	200.0 200.0	101.1
13	Check, No fertilizer	.....	77.4
14	Acid phosphate Cotton seed meal	300.0 300.0	95.5
15	Acid phosphate Nitrate of soda Sulphate of potash	355.0 140.0 9.0	92.2
16	Acid phosphate Nitrate of soda Sulphate of potash	177.0 70.0 4.5	79.6

In 1911 the average yield of plats 3 and 4, which received acid phosphate alone, was higher than the yield of any other plat receiving a different treatment. A mixture of 200 pounds each of acid phosphate and cottonseed meal produced the second largest yield. Sulphate of potash was less valuable than either acid phosphate or cottonseed meal.

Table 4 summarizes the results for the three-year period, showing the cost of fertilizer, the acre yield, acre increase, and acre value.

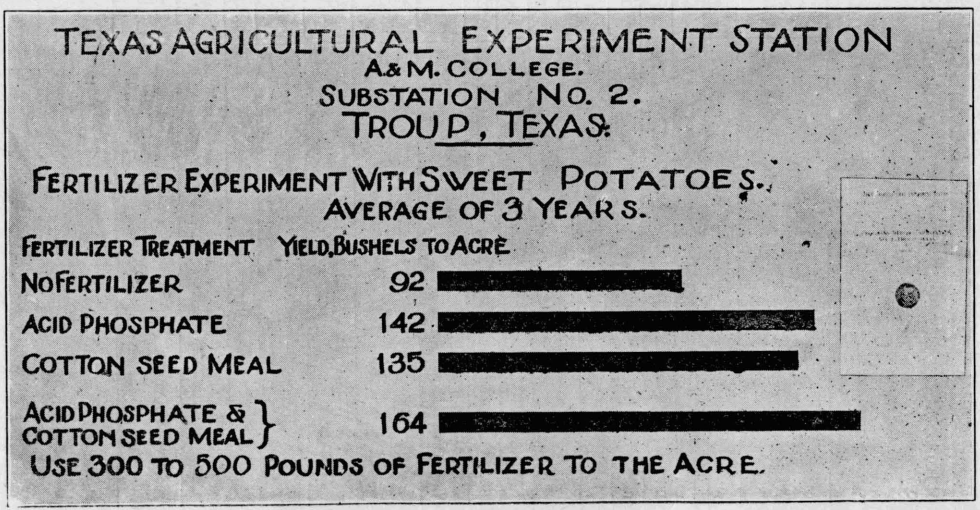
TEXAS AGRICULTURAL EXPERIMENT STATION
A&M. COLLEGE.
SUBSTATION NO. 2.
TROUP, TEXAS.
FERTILIZER EXPERIMENT WITH SWEET POTATOES.
AVERAGE OF 3 YEARS.
FERTILIZER TREATMENT
YIELD, BUSHELS TO ACRE
NO FERTILIZER
92
ACID PHOSPHATE
142
COTTON SEED MEAL
135
ACID PHOSPHATE & COTTON SEED MEAL
164
USE 300 TO 500 POUNDS OF FERTILIZER TO THE ACRE.

Table 4.—Summary.—Averages for 1907, 1908, and 1911.

Kind of fertilizer.	Cost of fertilizer per acre.	Acre yield in bushels.	Bushels per acre increase over unfertilized plats.	Acre value at 75c per bushel.	Value of increase at 75c per bushel.	Value of increase, after deducting cost of fertilizer at 75c per bushel.
Unfertilized	.....	92.1	.....	$ 69.00	.....	.....
Acid phosphate alone	$ 3.89	142.5	50.4	106.87	$ 37.80	$ 33.91
Cotton seed meal alone	5.74	135.3	43.2	101.47	32.40	26.66
Sulphate of potash	2.25	95.5	3.4	71.62	2.55	.30
Acid phosphate and cotton seed meal	6.00	164.1	72.0	123.07	54.00	48.00
Acid phosphate and sulphate of potash	4.93	134.0	41.9	100.50	31.42	26.49
Cotton seed meal and sulphate of potash	5.75	146.7	54.6	110.02	40.95	35.20
Acid phosphate, cotton seed meal and sulphate of potash	9.14	150.0	57.9	112.50	43.42	34.28
Acid phosphate, nitrate of soda and sulphate of potash	7.59	162.9	70.8	122.17	53.10	47.51

Of the fertilizer materials applied alone, acid phosphate gave the highest yield and cottonseed meal the second highest yield, while potash alone averaged the lowest of any of the fertilizers used.

The results show that potash, apparently, is not needed in the soil where these experiments were conducted.

Nitrate of soda appears to be a good source of nitrogen. Its use, however, would be governed by the cost of the nitrogen in this form as compared with the nitrogen in cottonseed meal.

The acid phosphate-cottonseed meal mixture gave the largest average increase in yield and the greatest net profit.

The exact proportions of acid phosphate and cottonseed meal that are most profitable are not clearly brought out in the results. This is a local problem which must be determined by the individual grower after a careful study of his conditions. A fertilizer, however, containing three parts of acid phosphate and two parts of cottonseed meal is suggested for ordinary East Texas sweet potato soils. Under ordinary conditions 300 to 500 pounds of the mixture to the acre should give very profitable yields.